

DRAFT ENGINEERING EVALUATION

**Plant No. 24791
Bennett House
53 Taylor Drive, Fairfax, CA 94930
Application No. 30735**

Background

On behalf of Bennett House, EDesignC, Inc. has applied to obtain an Authority to Construct and/or a Permit to Operate for the following equipment:

**S-1 Emergency Standby Generator Set: Natural Gas Engine, equipped with an integral three-way catalyst
Make: Generac, Model: E08.9GSN111A1, Model Year: 2020
153 bhp, 1.31 MMBtu/hr
Permit Condition No. 27326**

The engine will be located at 53 Taylor Drive, Fairfax, CA 94930. The primary emissions from S-1 include nitrogen oxides (NO_x), carbon monoxide (CO), precursor organic compounds (POC) from combustion of natural gas. Toxic air contaminants (TAC) including benzene, formaldehyde, and toluene are also emitted during combustion of natural gas. S-1 is abated by an integral 3-way catalyst, which reduces NO_x, CO, and POC emissions through non-selective catalytic reduction.

Emissions

Basis:

- 153 hp output rating
- Operating 50 hours per year
- Operating 24 hours maximum per day
- Maximum fuel usage of 1.31 MMBtu/hr
- Natural Gas energy content of 1050 btu/scf was assumed.
- No abatement efficiency was assumed for the engine.

The emission factors used to estimate NO_x, POC, and CO emissions from the natural gas engine generator set described above were provided by the engine manufacturer. Particulate matter with an aerodynamic diameter equal to 10 microns or less (PM₁₀), particulate matter with an aerodynamic diameter equal to 2.5 microns or less (PM_{2.5}) and sulfur dioxide (SO₂) emission factors are based on AP-42, Fifth Edition, Volume I Chapter 3: Stationary Internal Combustion Sources; Section 3.2 Natural Gas Fired Reciprocating Engines; Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines. The daily maximum emissions were calculated assuming 24-hr/day of operation. The emissions from S-1 are summarized in Table 1.

Table 1 - Annual and Daily Emissions for S-1

Pollutant	Abated E.F.	E.F. Unit	Abatement Efficiency (%)	Max Daily Emissions -Abated (lbs/day)	Abated Annual Emissions (lbs/yr)	Abated Annual Emissions (TPY)
NO _x	0.120 ^a	g/bhp-hr	0%	0.971	2.02	0.001
POC	0.110 ^a	g/bhp-hr	0%	0.890	1.86	0.001
CO	0.030 ^a	g/bhp-hr	0%	0.243	0.51	0.000
PM ₁₀	1.94E-02 ^b	lb/MMBtu	N/A	0.610	1.27	0.001
PM _{2.5}	1.94E-02 ^b	lb/MMBtu	N/A	0.610	1.27	0.001
SO ₂	5.88E-04 ^b	lb/MMBtu	N/A	0.018	0.04	0.000

^a The emission factors for NO_x, CO, and POC were provided by the manufacturer.

^b The emission factors for PM and SO₂ were retrieved from AP-42 Chapter 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-3. PM_{2.5} was assumed to equal PM₁₀.

Cumulative Increase

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from this application.

Table 2. Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Cumulative Emissions Post 4/5/91 (tons/yr)	Application Emissions (tons/yr)	New Cumulative Increase Emissions (tons/yr)
NO _x	0.000	0.001	0.001
POC	0.000	0.001	0.001
CO	0.000	0.000	0.000
PM ₁₀	0.000	0.001	0.001
PM _{2.5}	0.000	0.001	0.001
SO ₂	0.000	0.000	0.000

Health Risk Assessment (HRA)

The Toxic Air Contaminants (TACs) emission factors used to estimate emissions are from either AP-42, Table 3.2-3 “Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines” or the California Air Toxics Emission Factor Database (maintained by the California Air Resources Board) for natural gas fired 4-cycle rich burn engines.

The TAC emission estimates are based on uncontrolled emission factors for natural gas engines and an assumed abatement efficiency of 50% removal of organic TAC compounds, except for the pollutants which have abated emission factors in CATEF (benzene and formaldehyde).

As shown in Table 3, no TACs exceed the District's Risk Screening trigger levels set forth in Table 1 of Reg. 2-5 (New Source Review for Toxic Air Contaminants). There were no other related projects permitted in the last three years. Therefore, a Health Risk Assessment (HRA) is not required.

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Table 3: TAC Emission Estimates Based on CATEF or AP-42 Table 3.2-3

	Emission Factor	Assumed Abatement Efficiency	Abated Emissions	Acute Trigger Level	HRA Triggered?	Abated Emissions	Chronic Trigger Level	HRA Triggered?
	lbs/MMscf	%	lb/hr	lb/hr	YES/ -	lb/yr	lb/yr	YES/ -
1,1,2,2-Tetrachloroethane	2.66E-02	50	1.66E-05	-	-	8.28E-04	1.40E+00	-
1,1,2-Trichloroethane	1.61E-02	50	1.00E-05	-	-	5.01E-04	5.00E+00	-
1,1-Dichloroethane	1.19E-02	50	7.40E-06	-	-	3.70E-04	5.00E+01	-
1,2-Dichloroethane	1.19E-02	50	7.40E-06	-	-	3.70E-04	4.00E+00	-
1,2-Dichloropropane	1.37E-02	50	8.51E-06	-	-	4.26E-04	-	-
1,3-Butadiene	1.05E-01	50	6.52E-05	1.50E+00	-	3.26E-03	4.80E-01	-
1,3-Dichloropropene	1.33E-02	50	8.31E-06	-	-	4.16E-04	-	-
Acenaphthene	3.39E-03	50	2.11E-06	-	-	1.06E-04	-	-
Acenaphthylene	1.62E-02	50	1.01E-05	-	-	5.05E-04	-	-
Acetaldehyde	1.82E+00	50	1.14E-03	1.00E+00	-	5.68E-02	2.90E+01	-
Acrolein	1.37E+00	50	8.56E-04	5.50E-03	-	4.28E-02	1.40E+01	-
Anthracene	2.26E-03	50	1.41E-06	-	-	7.04E-05	-	-
Benzene	1.02E+01	0	1.27E-02	6.00E-02	-	6.37E-01	2.90E+00	-
Benzo(g,h,i)perylene	2.45E-04	50	1.53E-07	-	-	7.63E-06	-	-
Butyr/isobutyraldehyde	5.10E-02	50	3.18E-05	-	-	1.59E-03	-	-
Carbon Tetrachloride	1.86E-02	50	1.16E-05	4.20E+00	-	5.79E-04	1.90E+00	-
Chlorobenzene	1.35E-02	50	8.45E-06	-	-	4.22E-04	3.90E+04	-
Chloroform	1.44E-02	50	8.97E-06	3.30E-01	-	4.48E-04	1.50E+01	-
Ethane	7.39E+01	50	4.61E-02	-	-	2.30E+00	-	-
Ethylbenzene	1.44E-02	50	8.95E-06	-	-	4.48E-04	2.90E+00	-
Ethylene Dibromide	2.24E-02	50	1.39E-05	-	-	6.97E-04	1.10E+00	-
Fluoranthene	1.20E-03	50	7.51E-07	-	-	3.76E-05	-	-
Fluorene	9.04E-03	50	5.63E-06	-	-	2.82E-04	-	-
Formaldehyde	1.14E+01	0	1.42E-02	1.20E-01	-	7.11E-01	1.40E+01	-
Methanol	3.21E+00	50	2.00E-03	6.20E+01	-	1.00E-01	1.50E+05	-
Methylene Chloride	4.33E-02	50	2.70E-05	3.10E+01	-	1.35E-03	8.20E+01	-
Naphthalene	8.66E-02	50	5.40E-05	-	-	2.70E-03	2.40E+00	-
PAH (CATEF)	2.66E-04	50	1.66E-07	-	-	8.30E-06	3.30E-03	-
Phenanthrene	8.85E-03	50	5.52E-06	-	-	2.76E-04	-	-
Propylene	4.20E+01	50	2.62E-02	-	-	1.31E+00	1.20E+05	-
Pyrene	2.64E-03	50	1.64E-06	-	-	8.22E-05	-	-
Styrene	1.25E-02	50	7.79E-06	4.60E+01	-	3.90E-04	3.50E+04	-
Toluene	2.62E+00	50	1.64E-03	8.20E+01	-	8.18E-02	1.20E+04	-
Vinyl Chloride	7.54E-03	50	4.70E-06	4.00E+02	-	2.35E-04	1.10E+00	-
Xylene	7.38E-02	50	4.60E-05	4.90E+01	-	2.30E-03	2.70E+04	-
Xylene (m,p)	4.54E-01	50	2.83E-04	4.90E+01	-	1.41E-02	2.70E+04	-
Xylene (o)	2.22E-01	50	1.38E-04	4.90E+01	-	6.91E-03	2.70E+04	-

Best Available Control Technology (BACT)

Per Regulation 2-2-301, any new source is required to use Best Available Control Technology (BACT) to control emissions of any District BACT pollutants [precursor organic compounds (POC), non-precursor organic compounds (NPOC), oxides of nitrogen (NO_x), sulfur dioxide (SO₂), PM₁₀, PM_{2.5}, and/or carbon monoxide (CO)] that have the potential to emit 10 or more pounds on any day.

Based on the emission calculations in Table 1, BACT is not triggered for S-1.

Offsets

Offset must be provided for any new or modified source at a facility that will have the potential to emit more than 10 tons per year of NO_x or POC, as specified in Regulation 2-2-302; and more than 100 tons per year of PM_{2.5}, PM₁₀ or sulfur dioxide, as specified in Regulation 2-2-303.

Table 4. Potential to Emit (PTE) for Plant #24791

Pollutant	Existing Cumulative Emissions (TPY)	Application Emissions Increase ^a (TPY)	Facility Annual Emissions (TPY)	Offset Requirement (TPY)	Offset Required?
NO _x	0.000	0.003	0.003	10	N
POC	0.000	0.003	0.003	10	N
CO	0.000	0.001	0.001	-	N
PM ₁₀	0.000	0.002	0.002	100	N
PM _{2.5}	0.000	0.002	0.002	100	N
SO ₂	0.000	0.000	0.000	100	N

^a Application Annual Emissions, abated: Reliability-related activity of 50 hours and emergency operation of 100 hours for S-1.

As shown in Table 4, offsets are not required for this application.

Statement of Compliance

The owner/operator of S-1 shall comply with Regulation 6-1 (Particulate Matter and Visible Emissions Standards), Regulation 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide), and Regulation 9-8 (Inorganic Gaseous Pollutants: Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines).

The owner/operator is subject to Regulation 6-1-303 since S-1 has a displacement of 543 in³. Thus, for any period aggregating more than three minutes in any hour, there should be no visible emission as dark or darker than No. 2 on the Ringelmann Chart and no visible emission to exceed 40% opacity. The engine is expected to meet this requirement with regular maintenance and inspection. S-1 will emit a very small amount of PM₁₀, it is not expected to produce visible emissions and will be assumed to be in compliance with

Regulation 6-1-305, which prohibits fallout on adjacent properties. The PM₁₀ emission rate from S-1 is 0.075 grams/bhp-hr, which results in an outlet grain loading of 0.0148 grains/dscf at 0% O₂. The emission rate is less than the limit of 0.15 grains/dscf and is expected to comply with Regulation 6-1-310.

Regulation 9-1-301 (Limitations on Ground Level Concentrations) prohibits emissions from any sources other than ships, SO₂ in quantities which result in ground level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes or 0.05 ppm averaged over 24 hours. Natural Gas will be used to meet the sulfur limitation of 0.5 wt% in Regulation 9-1-304 (Fuel Burning) as well as to minimize SO₂ emissions to comply with Regulation 9-1-301. Thus, S-1 is expected to comply with Regulation 9-1.

Based on Regulation 9-8-110.5 (Exemptions for Emergency Standby Engines), S-1 is exempt from the requirements of Sections 9-8-301 through 305, 501 and 503. However, S-1 is subject to the monitoring and record keeping procedures described in Regulation 9-8-530 (Emergency Standby and Low Usage Engines, Monitoring and Recordkeeping) and Regulation 9-8-502 (Recordkeeping). The requirements of this Regulation are included in the permit conditions. S-1 is also subject to and expected to comply with Regulation 9-8-330 (Emergency Standby Engines, Hours of Operation) since non-emergency hours of operation will be limited in the permit conditions to 50 hours per calendar year.

Thus, S-1 is expected to comply with Regulation 9-8.

California Environmental Quality Act (CEQA)

This project is considered to be ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3.2) and is therefore not subject to CEQA review.

New Source Performance Standards (NSPS)

40 CFR 60, Subpart JJJJ (*Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*)

S-1 is subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition (SI) Internal Combustion Engines (ICEs), Section 60.4230(a)(4)(iv) because the engine is an emergency engine which is manufactured on or after January 1, 2009 and has a maximum engine power greater than 19 kW (25 hp).

Section 60.4233(e) requires that owners and operators of stationary spark ignition internal combustion engines with a maximum engine power greater than or equal to 75 kW (100 hp (except gasoline and rich burn engines that use LPG) must comply with following emission standards:

NO_x: 2.0 g/bhp-hr

CO: 4.0 g/bhp-hr

VOC: 1.0 g/bhp-hr

Based on the exhaust emissions provided by the engine manufacturer, S-1 is expected to comply with the emission standards set forth in 40 CFR 60, Subpart JJJJ.

National Emissions Standards for Hazardous Air Pollutants (NESHAP)

S-1 is subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE). Per 40 CFR 63.6590(c)(1), a new or reconstructed stationary RICE located at an area source must meet the requirements of 40 CFR part 60 subpart JJJJ, for spark ignition engines. As stated above in the NSPS section, S-1 is expected to comply with the requirements of 40 CFR part 60 subpart JJJJ.

Prevention of Significant Deterioration (PSD)

Regulation 2-2-224 defines a PSD project as one at a facility that has the potential to emit 100 tons or more per year of any PSD pollutant. This facility will not have the potential to emit 100 tons or more of any PSD pollutant therefore, this project is not a PSD project.

School Notification (Regulation 2-1-412)

A new or modified source located within 1,000 feet of the outer boundary of a K-12 school site which results in an increase of emissions from toxic air contaminants is subject to the public notice requirement. The outer boundary of the nearest K-12 school, Ross Valley Charter School, is approximately 220 feet from the location of this project as shown in the attached Google Earth ruler screenshot. Thus, this project is subject to the public notification requirements of Regulation 2-1-412.

Permit Conditions

Permit Condition 27326 for S-1

1. The owner or operator shall operate the stationary emergency standby engine only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year.

(Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)

2. The Owner/Operator shall equip the emergency standby engine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage.

(Basis: Emergency Standby Engines, Monitoring and Record keeping 9-8-530)

3. The Owner/Operator shall not operate unless the natural gas fired engine is abated with an integral three-way catalyst.

(Basis: Cumulative Increase)

4. Records: The Owner/Operator shall maintain the following monthly records in a District- approved log for at least 24 months from the date of entry. Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
 - a. Hours of operation (maintenance and testing).
 - b. Hours of operation for emission testing.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage or operating hours for engine.

(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

End of Conditions

Recommendation

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct /Permit to Operate for the equipment listed below. However, the proposed source will be located within 1,000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct/Permit to Operate for the following source:

S-1 Emergency Standby Generator Set: Natural Gas Engine
Make: Generac, Model: E08.9GSN111A1, Model Year: 2020
153 bhp, 1.31 MMBtu/hr
Permit Condition No. 27326

Prepared by:

Date: 10/15/2020

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